From Correspondence Teaching to MOOCs

University of Oulu
Faculty of Information Technology and Electrical Engineering / Information Processing Science
Bachelor's Thesis
Ville Siikaluoma
21.11.2019

Abstract

This thesis deals with the history and contemporary developments of distance education, e-learning, m-learning, and the possible future developments of these three, often interchangeably used concepts. In addition, particular observation will be applied to xAPI, (or experienceAPI), an online learning framework developed by the ADL Initiative and the United States Department of Defense. The method applied was a literary review, with some parts from known journals and others from commonly known media establishments as well as primary sources in the form of materials supplied by the first hand publisher/s.

The results of the literary review indicate a need for further study of the field and the theories associated with it, both in the field of information processing science and e-pedagogics. There is a significant drive for digitalizing the learning process, but the tools are almost as many as the actors in the field.

Keywords
MOOC, MOOCs, edX, e-learning, m-learning, online learning, Codecademy, Udacity, Udemy, education export, Keegan, xAPI, SCORM

Supervisor
Kari Liukkunen, PhD

Foreword

The spark for pursuing this line of research came from my time being involved with the student union at the University of Oulu. During my time there I was heavily involved with the international section and topics related to the international aspect of studies in the Finnish higher education system. Part of these topics was the commercialization of higher education following the international acclaim of the Finnish school system, and further, the topic on MOOCs and the chances for achieving them for institutes for higher education in Finland – namely the universities offering bachelors' and masters' degrees and universities of applied sciences offering bachelors' degrees. While we advocated a concept resembling a "University of Finland" – an online, subscription based MOOC – the powers that be instead ended on imposing mandatory tuition fees for students outside the EU/EEC.

Oulu, November 21st, 2019

Glossary

MOOC	Massive Open Online Course, a free online course
EU/EEC	European Union / European Economic Community. A conglomeration of countries on the European continent.
ISP	Internet Service Provider
edX	An online learning service provider organized as a joint venture between multiple universities mainly in the United States
multimodality	A term for information that includes or can include text, audio, video, or any other medium of knowledge transfer that is a co-occurrence of two or more semiotic systems
RFID	Radio-frequency identification, where the exchange of small packets of information occurs through electromagnetic fields in close proximity to one another

Contents

1. Introduction

In the time leading up to the modern situation of MOOCs (Massive Open Online Courses) being offered as a casual way of accumulating personal skills and knowledge, there have been a plethora of different approaches to offering education not bound to traditional academia and brick-and-mortar facilities. Some of the approaches have included a form of telephone courses, where individuals in rural communities have gathered up in a community centre or private residence and, through a loudspeaker-microphone system connected with a lecturer giving a lecture at a campus facility. Other methods have included burning and shipping lectures on CD-ROM and DVD-R -disks through mail in addition to presenting these materials online (Pankkonen, 2005). Due to advancements in network infrastructure these practices have since given way to online streaming through the developments in bandwidth and speeds provided by ISPs (Internet Service Providers) (Young, 2013). The timeline related to these advancements is something we will clarify in this thesis, dealing with the field of distance education, and this thesis will also explore the early iterations of modern distance education.

The reason this field is especially important to study is because of how online education and decentralized education can be considered the way for the future, where the means for accessing information seem to be growing exponentially more ubiquitous, as the matter of access to education becomes more of a matter of equality and equity. Equally so, as the interval for adoption of new technologies and ways of executing labour grows smaller and the needs of companies become more and more fluid, there is a definite need for both employees and employers to gain and provide access to lifelong education – the chance to supplement and pivot their expertise to suit the needs of the market. (Pankkonen, 2005)

To provide a supply for this demand, a diverse range of different service providers race to compete for the limited time online users have at their disposal, marketing education through limited time offers and deals. Many such operators are mostly functioning as platforms, providing content creators a platform to sell their courseware either through paid promotion provided by the platform or through the content creator themselves steering traffic and customers to the platform – content creator revenues in cases such as this range from 25-97% of the revenue share on one of the platforms observed (Udemy Support, retrieved on 16.8.2018). In this way, there can also be seen to be a form of equality of opportunity between established content creators and journeymen tutors, much in the way that in the music industry the resources provided by record label conglomerates can be either a boon or a deterrent to a recording artist.

As it stands, it can be argued that there is a possible boom of supplemental education being viewed as a capital resource to those who are able to invest in it, especially in developing countries (Rustiadi, 2014). While the concept and practice of education-as-a-service has in fact existed for centuries, never has it had the possibility of being such an ubiquitous phenomenon as it does in the now, through the advancements in computer networking and the Internet.

This thesis will provide an overview of how distance education has changed and progressed to its current state through the last few centuries, where anyone with access to the Internet can educate themselves from all matters between calligraphy and

astrophysics. Moreover, this thesis will show a parallel between technological advancements and opportunities for supplemental education, while exploring recurring themes; such as how the three main drivers for supplemental education have been the formal, the commercial, and the want for information as related to a hobby. This thesis will seek to help to understand the trends in the field of distance education, while examining the past events that have led the field to the current state. The thesis will firstly deal with the base definitions of the themes in this thesis, then approach the history of distance education from correspondence courses offered by Caleb Phillips in the 18th century, through the advancement of methods through the availability of more and more advanced technology and further onward to modern, formalized technological frameworks in the field of distance education in the form of xAPI, which reached version 1.0.0 in 2013. Moreover, this thesis examines the different terms and phenomena at the core of this thesis, followed by a discussion on current methods of distance education on the best practices and methods in the field, legal and philosophical issues, as well as current national and international programs. Finally, this thesis will conclude in hypothesizing on the future of distance education going further into the 21st century.

2. Distance education demystified

A simplified way of thinking about distance education is to think of a correspondence course. The learner, is situated wherever they are, and are not required to relocate or move long distances to be able to participate in education. In the past, the method primarily in use was in fact correspondence. You wrote your teacher, the teacher sent you materials and tasks, you completed those tasks, et cetera. In the modern era the practice remains greatly the same, although the medium of knowledge transportation has evolved over time. In a way, there has been a steady for of characteristics that have not changed through the years in the field. Holmberg (2005) lists the five characteristics of distance education, paraphrasing the work of Desmond Keegan (1986, 1990, 1998). These are

- the quasi-permanent separation of teacher and learner throughout the length of the learning process;
- the influence of an educational organisation both in the planning and preparation of learning materials and in the provision of student-support services;
- the use of technical media – that is to say print, audio, video or computer – to unite teacher and learner;
- the provision of two-way communication so that the student may benefit from or even initiate dialogue; and
- the quasi-permanent absence of the learning group throughout the length of the learning process, with the possibility of occasional meetings for both didactic and socialization purposes. (Keegan, 1990)

In the late 2010s, the learners are likely seated at a computer or holding a handheld device, receiving the educational material through an audiovisual lecture. Or maybe they are reading through lecture slides or other course material the teacher provided them. Be the case as it may, they are not tied down to a single place to learn – be it a lecture hall, a writing desk, or a dedicated computer terminal. Their education is mobile, and they have a great deal of material to choose from.

Distance education material can be characterized through its multimodality, especially where distance education can be referred to as blended learning (Picciano, 2009) – referring to a situation where mural and extramural teaching blends together. Picciano also considered modality to include the separation of the form of study, with the separation of the online component from the contact hours. Distance education, in the modern world, is often spoken of in the same fashion as any other “modernized” concept is, by placing a prepositionary character before it. The current trend seems to still favor e-learning as a word, although “online learning” seems to be solidifying its presence as an umbrella term alongside e-learning (Figure 2.2.1).

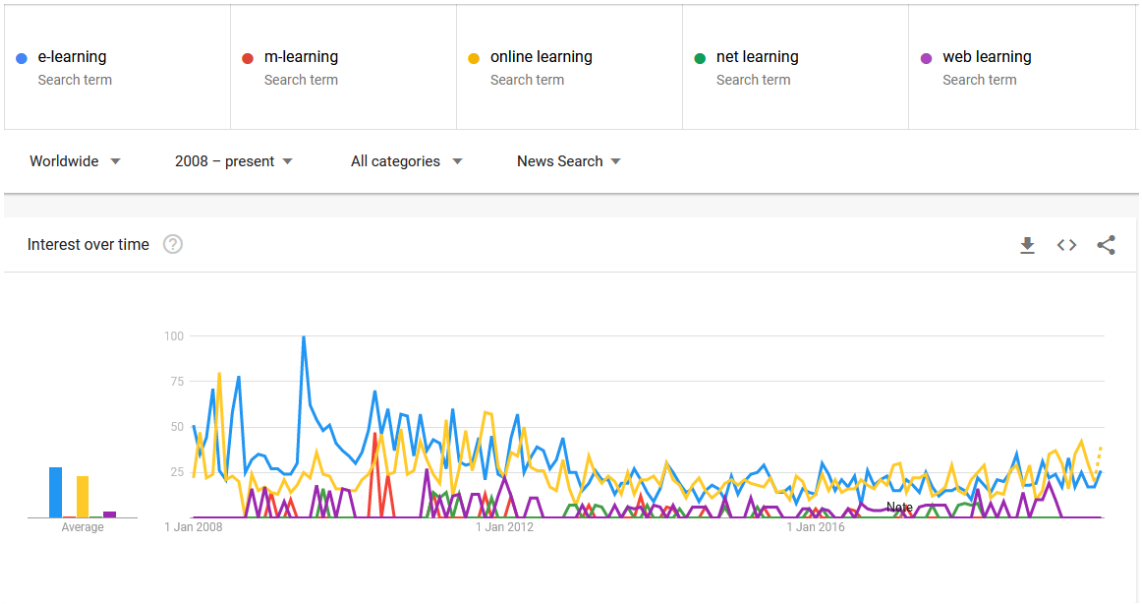

Figure 2.2.1 *Comparison of distance education terms on Google Trends.* Retrieved on 15.9.2019 from https://trends.google.com/trends/explore?date=all_2008&gprop=news&q=e-learning,m-learning,online%20learning,net%20learning,web%20learning

2.1 Open education

When one speaks of e-Learning or m-Learning one must also bring into account, through the history of the field, in respect to their characteristic of availability, the concept of open education. According to Michael A. Peters and Rodrigo G. Britez, in their book *Open Education and Education for Openness* posit that:

> [o]pen education as a movement sits within the broader framework of the history of openness that brings together a number of disciplines and fields to impact directly upon the value of knowledge and learning, their geographic distribution and ownership, and their organization. (p. xvii)

Peters goes on to say that:

> [w]e can consider open publishing, open access and archiving as parts of the wider movement called *Open Education* that builds on the nested and evolving convergences of open source, open access and open science, and also emblematic of a set of still wider political and economic changes that ushers in 'social production' as an aspect of the global digital economy, an economy that is both fragile and volatile[…] (p. 4)

2.2 e-Learning

In this regard the modern wave of availability of m-learning and e-learning has its roots in this culture of openness, in the sense that higher education, as a part of the transparency movement, is to be available to people of all walks of life. Peters further claims, paraphrasing Materu (2004), that "[t]he present decade can be called the 'open' decade (open source, open systems, open standards, open archives, open everything) just as the 1990s were called the 'electronic decade (e-text, e-learning, e-commerce, e-governance)" (Peters & Britez, 2008). Based on this it can be said that the cycle of adding an individual character to concepts continues, with the 1990s being an era of 'e',

the 2000s being the decade of 'o', and the 2010s being a decade of 'm', with more and more systems and societal functions being transferred into a mobile form through the use of biometrics and technologies such as RFID.

Peters further discusses this in his paper *The History and Emergent Paradigm of Open Education* and the subsection *The Utopian History of 'Openness' in Education: From the Open Classroom to OCW*. Peters posits that the groundwork laid out by the early 20th century philosophers such as Bertrand Russell, Homer Lane, and A.S. Neill as they "were wedded to the classical enlightenment doctrine of freedom and autonomy in education" (Peters, 2008). Peters sees them as forming the basis for five 'utopian historical moments': the Open Classroom, Open Schooling, the Open University, Open Courseware, and Open Education (Peters, 2008).

2.3 m-Learning

Helen Crompton discusses the history of the emergence of mobile learning – or m-learning – basing her position of the coinage of the term on Google Search statistics:

> At this time, there is no definitive definition of m-learning. If terms such as distance education are any indication, there probably will not be a lasting definition of m-learning for a long time to come. In January 2005, Laouris and Eteokleous (2005) reported receiving 1,240 items when searching Google for the terms + "mobile learning" + "definition"; remarkably, when they conducted the same search in June 2005, Google provided 22,700 items. So, it appears that 2005 was the year in which m-learning became a recognized term. (Crompton, 2013)

She further goes on to exhibit the proposed definitions of m-learning as a term, referring to works by Laouris & Eteoklous, 2005; Sharples, Taylor, & Vavoula, 2007; and Traxler, 2009. Crompton (2013) concluded that "pedagogy, technological devices, context, and social interactions are the four central constructs [of m-learning]." (Crompton, 2013) This approach differs from the one set out by Keegan's work in that it leaves out the factors of separation as a given and communication as being an individualized experience. This definition of the four central constructs also separates Keegan's characteristic of there being a quasi-permanent absence of the learning group (Holmberg, 2005), dividing it into the concepts of social interactions and context. However, Crompton, further posits that

> "m-learning can occur inside or outside the classroom, participating in a formal lesson on a mobile device; it can be self-directed, as a person determines his or her own approach to satisfy a learning goal; or spontaneous learning, as a person can use the device to look up something that has just prompted an interest. The environment may be part of the learning experience (e.g., scanning codes to obtain further information about an exhibit in a museum), or the environment may have a neutral role in the learning experience (e.g., reading articles from the Web while traveling on the bus)." (Crompton, 2013)

Therefore, this approach also includes forms of informal education and "search for knowledge" that is motivated by curiosity or entertainment. In that sense, one could argue that as technological advances and the availability of information as an ubiquitous resource have increased, there needs to be a shift in definition of education as a concept, with people being able to acquire information and knowledge on the go and without the

constraints of extramural education environments. This is a facet of learning that has been shown to evolve over the span of modern history.

3. History and background

The history of distance education is one that stretches back centuries. The very first instances that can be considered distance education according to our contemporary definition would be the publishing of an advertisement in the Boston Gazette in 1728, where: “Caleb Phillips, teacher of the new method of Short Hand” would be available to send weekly instructional materials to those living in the countryside (Holmberg 2008).

Moore and Kearsley, in their 1996 book *Distance Education: A Systems Approach*, talk of the history behind distance education and the factors leading to the modern model of distance education one uses and experiences in the modern age. They suggest that, “distance education has evolved through a number of different stages, or generations. The first generation was correspondence study […] [t]he second generation of distance education began with the appearance of the first Open Universities in the early 1970s” and ultimately leading to “the third generation of distance education: delivery of course materials by broadcast television or videotape” with a “new generation of distance education emerging based on computer conferencing networks and computer-based multimedia workstations” (Moore & Kearsley, 1996).

Moore and Kearsley were, as one can observe in our daily online interactions, correct in their predictions, with a select few things that might have come as a form of surprise to them; namely, that one of the single most popular methods of an individual educating themselves would be on-demand, free of charge, multimedia recordings of lectures. In fact, they do posit that the modern method will be bringing distance education back “full circle, since in many ways teaching and learning by this medium is surely an electronic-age correspondence course.” (p. 34) In addition to this, they posit that “[w]ith ISDN and fiber-optic lines, as well as improvements in [a plethora of things]” we would eventually, when it comes to distance education, come to a situation where we would have a “workstation that allows communication […] on a one-to-one or one-to-many basis in real time.” (p.34), suggesting that the idea of recorded high-definition videos would be yet unreachable. An understandable position to take, seeing as, in 1996, Hewlett Packard’s Flagship home computer had a hard drive that could fit 1.6 Gb. (Rosen, 2011).

As such, in this chapter, one will be exploring the development of distance education from the early 20th century to the modern age, following Moore and Kearsley in their assertions and observations. One will be beginning the retrospective by defining distance education through the work of Desmond Keegan as paraphrased by Börje Holmberg and mirror that on how those characteristics can be seen in the development of distance education during that century.

3.1 Distance education from the early- to the mid-late-20th century

It can be argued that the positions put forth by Holmberg (2005) form a foundation on the principles of distance education and that they can be seen to hold their value through the different phases of distance education history.

Holmberg proceeds to quote William Lighty of the University in Wisconsin, from 1915, on his findings on the relationship between teacher and student in correspondence and distance education:

> In extramural teaching must be created the method, the technique, the atmosphere, which shall give the university a new meaning in democracy. For him (the extra-mural teacher) it is to solve the difficult problems connected with long distance instruction. Their solution has hardly begun. He must be able to do more than correct errors and communicate information. […] The supreme test of teaching is the capacity to do this, and in no field is there so fine an opportunity as exists in extramural teaching.
>
> […]
>
> The new type of teacher and the new type of text and instruction are required because we have a new type of student from that in the conventional school. He is generally an adult student. He has a fairly definite idea as to what he needs and wants, and often an almost equally definite idea as to what he does not want. He has to be convinced by logic and experience, and not by rule of order, of the position of the teacher, for none of the ordinary compulsions operating in the intramural instruction are effective here. The student makes up his mind quite promptly on an early, if not the first, examination of the lessons or course as to whether it is worth his while. ... With the type of student suggested, it follows that there must be changed standards of success and failure for extramural students. A man may go through half or a third of a course and get all he needs or wants to satisfy his original purpose. (From the *Proceedings of the first Conference* of the National University Extension, pp. 75-83, reprinted in Mackenzie & Christensen, 1971, pp. 14-22)

In this excerpt, it can be seen that the fundamental ideas of distance education have not changed particularly much in the last century. The excerpt also brings into view the different status and background of the distance student: they are generally seen to be an adult with experience in life and one that has passed the point where a strict schoolmaster-pupil dichotomy is neither useful nor wanted.

This attitude has extended into the modern system, where students participating in MOOCs may sample a course and then informally unenroll completely, resulting in a large number of early enthusiasts but a significantly lower course graduation rate, such as in the early edX course “Circuits and Electronics”, where 155,000 students enrolled for the course, and 7,157 eventually proceeded to pass the course. (Hardesty, 2012)

William Lighty, however, lived in an age when commercial radio was first becoming available to the public at a relatively reasonable price and when privately held companies were being given licences to broadcast for a radio audience. The United States government instituted in 1912 the Radio Act of 1912 that “a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication […] except under and in accordance with a license” (US 62. Congress; 1912), thus opening the door for a regulated, listed and licenced radio stations to begin offering material to the masses at large. This type of broadcast education may however be considered to be largely non-targeted, as it is characteristic of radio broadcasts are that they are open to listen to for anyone with the technology to receive the transmission. According to Saba (2013), the U.S. Department of Education took an “active role in educational radio” in the 1930s. Saba goes on to quote some of

the programs being broadcasted as “Let the freedom Ring”, “Trial by Jury”, “Free Assembly”, “Women’s and Children’s Rights” and “Free Press”, covering subjects that would today be considered to be essentials in civics education.

Moore and Kearsley discuss the historical context for distance education in *Distance Education: A Systems View of Online Learning*. They organize the history of distance education to five generations by based on the technology or phenomenon available: correspondence, broadcast radio & television, open universities, teleconferencing, and Internet/Web (Moore & Kearsley, 2012).

They posit that “[t]he late 1960s and early 1970s was a time of critical change in distance education” in how technology and human resources were organized more than in how the technology surrounding education developed, with experiments in both, continuing that “[t]he two most important experiments were the University of Wisconsin’s AIM Project and Great Britain’s Open University”.

The AIM (Articulated Instructional Media) Project explored/examined the combination of information delivery through multiple mediums. The project attempted, in essence, to create an early form of multimodal distance education by utilizing “printed study guides and correspondence tutoring, programs broadcast by radio and television, recorded audiotapes, telephone conferences, kits for home experiments, and local library resources” supplementing these with “student support and counselling, discussions in local study groups, and use of university laboratories during vacation periods”. Moore and Kersley consider the AIM Project “a historic milestone and turning point in the history of distance education”.

Moore’s and Kersley’s opinion is further reinforced by their discussions on the UK Open University. Moore and Kersley state that while the basis for the UKOU was based in a governmental committee, the invitation to consult for Charles Wedemeyer – the director of the AIM Project – was essential in creating a successful experiment in distance education. The UKOU did have characteristics that AIM lacked: “economies of scale by having more students than any other university, having a strong level of funding, and employing the fullest range of communications technologies to teach a full university curriculum to any adult who wanted such education” (p. 33) as opposed to AIM’s three fatal flaws: “no control over its faculty, and hence its curriculum; it lacked control over its funds: and it had no control over academic rewards (credits, degrees) for its students”.

As a summation on AIM and UKOU, it can be argued that while the AIM Project had great and grand ideas, the UKOU took those ideas, refined them, and perfected the formula for its time. Considering that both of these were based in the proliferation of multimodal portable media, there is a strong connection to the development of said media, namely the zenith of the c-cassette in the 1970s and 1980s (Millard, p. 529), the birth of the Compact Disc and the popularization of digital audio in the late 1980s and especially early 1990s, and further as digital video was came to the public consciousness through the widespread adoption of the Digital Versatile Disc (Uhlig, 2004) - before all of these operations moved on to the internet.

3.2 Education in the wires, the Internet and mass data

The proliferation of simple, rewritable data mediums increased the availability of information sharing to increase, especially with the advancement and increase of access of the global internet. According to the International Telecommunication Union, there were approximately 39,9 internet users per 100 people worldwide in 2014, with there being a stark contrast between the developed world and the developing world. In 2017, the global figure was 48,0 users per 100 individuals worldwide, with the developing world seeing faster growth than the developed world (figure 3.2.1).

Key ICT indicators for developed and developing countries and the world (totals and penetration rates)

	Per 100 inhabitants												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*
Individuals using the Internet													
Developed	51.3	53.5	59.1	61.3	62.9	66.5	67.7	72.0	73.8	75.6	77.4	79.6	81.0
Developing	7.7	9.3	11.8	14.5	17.2	20.6	23.4	26.3	29.0	32.4	36.1	39.0	41.3
World	15.8	17.6	20.5	23.1	25.5	28.9	31.3	34.3	36.9	39.9	43.2	45.9	48.0
LDCs	0.8	1.1	1.9	2.1	2.7	4.3	4.8	6.1	7.5	10.5	13.0	15.6	17.5

Rounded values. N/A: Not available.
The developed/developing country classifications are based on the UN M49, see: http://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx

Figure 3.2.1 "Key ICT indicators for developed and developing countries and the world (totals and penetration rates)" https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

All stages of education, from a preschool level all the way to cutting edge academic research, are becoming more and more accessible as the availability of information improves with time (figure 3.2.2). This gives both individuals and organisations, large and small, an opportunity to develop the education and improve the skills of themselves or their affiliates.

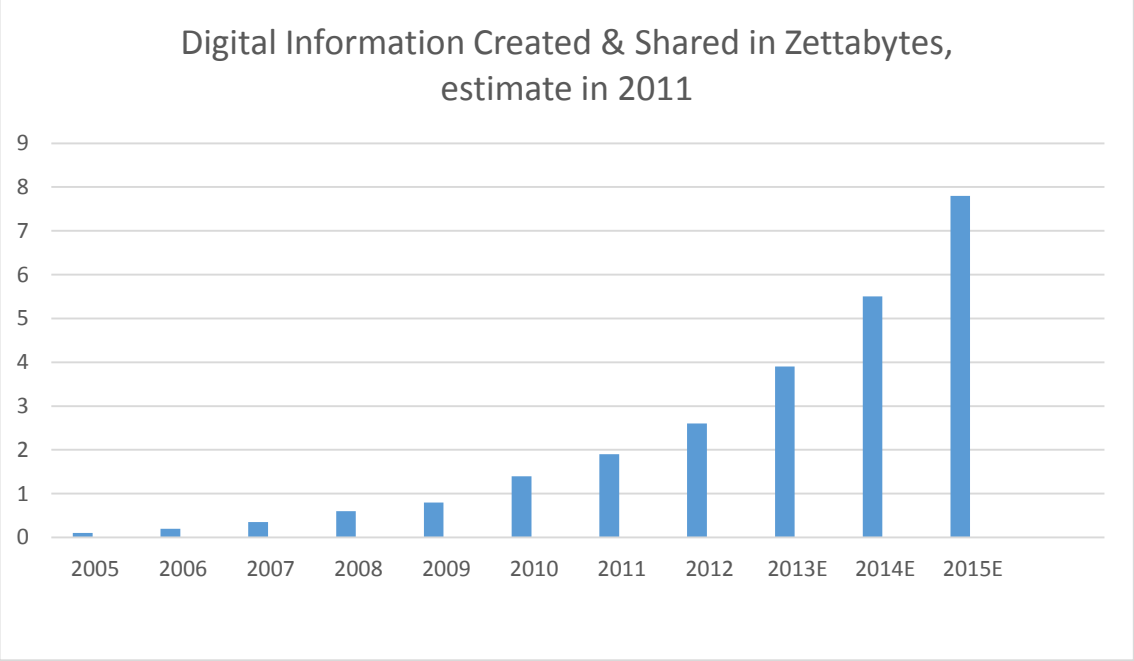

Figure 3.2.2.: Source: "KPCB Internet Trends 2013" https://www.slideshare.net/kleinerperkins/kpcb-internet-trends-2013

With the continuous and exponential increase of information on the internet, there has also been a surge of content providers and content provided for educational purposes. Recipes, how-tos, let's plays, lessons, lectures, courses – all available for the layman to find, and to teach.

Cisco and their Connections Counter estimate that the amount of objects connected to the internet is expected to reach 50 billion objects by the year 2020 (figure 3.2.3). However, Lueth at IoT Analytics gives another figure, saying that there are approximately 17 billion devices connected to the internet in 2018 (figure 3.2.4). With this comes another increasingly massive source of data to process and examine.

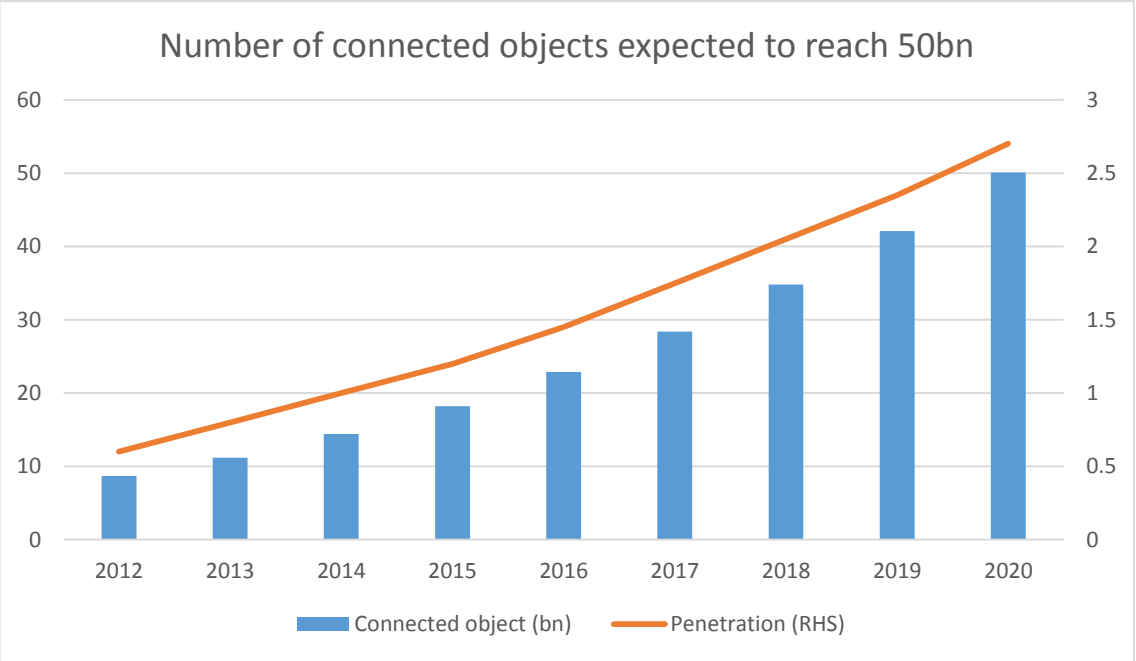

Figure 3.2.3.: Source: "Connections Counter: The Internet of Everything in Motion" https://newsroom.cisco.com/feature-content?articleId=1208342

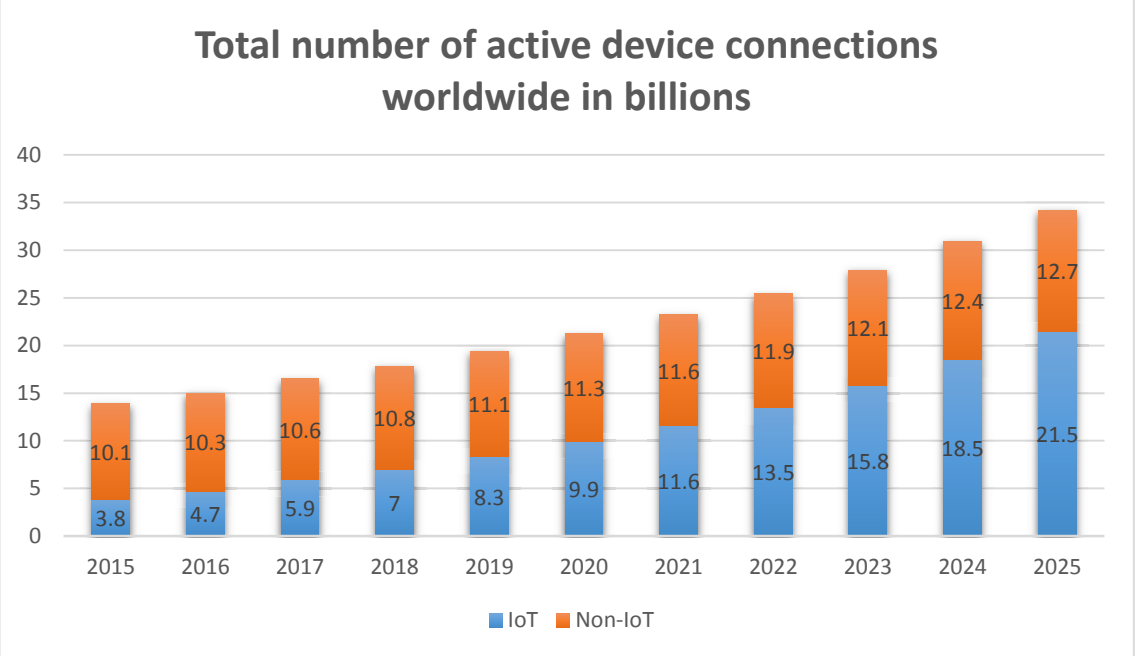

Figure 3.2.4.: Source: "State of the IoT 2018: Number of IoT devices now at 7B – Market accelerating" https://iot-analytics.com/state-of-the-iot-update-q1-q2-2018-number-of-iot-devices-now-7b/

The ways of making use of these constant streams of data are many, and can be both processed both by information systems and through philosophy, through xAPI and through Keegan's Five Characteristics.

Universities are increasingly adding an interest in online education and e-learning. In Europe, the Bologna Process 2020 -project aims to "aims to educate more people, but not just a higher number of people, but also includes more individuals with different backgrounds with respect to age, culture and experience in education and the workforce" (Ossiannilsson, 2012).

Reflecting this back on Keegan's Five Characteristics, we can see the same themes of extramural education continuing through the very first instances of distance education and on towards the modern age. These characteristics will be expanded on in the following subchapter.

3.2 On Keegan's Five Characteristics

Keegan's Five Characteristics are a framework for explaining the differences between traditional, conventional teaching and distance learning, using five concepts. For a learning event to be truly distance learning, surely, they have to fulfill all characteristics.

Keegan's Five Characteristics can be summarized, in order, using the following five keywords:

1) Separation;
2) Influence;
3) Technology;
4) Communication;
5) Absence.

Separation in contemporary distance learning environments can be simply characterized as the physical separation between the learner or pupil and the system in question – this is particularly true in cases where the learner or pupil uses a platform that encourages and is based on independent work. Systems like this are, for instance, those offered by Codecademy and Udacity for "free" users, users who do not uphold a subscription. According to Holmberg (2005), paraphrasing Keegan, this particularly "distinguishes it from conventional face-to-face education".

The factor described above as "influence" is something that distinguishes distance education from practical self-study, as it posits that there must be an organization which prepares and delivers the study material and course content. Holmberg (2005) also includes the possibility of "student-support services", which would include a modicum of communication in situation which necessitate such actions.

The question of technology in our contemporary world has become somewhat moot or trivial. There exists a situation where communication is handled through technological means, the "use of technical media – print, audio, video or computer – to unite teacher and learner and carry the content of the course" (Holmberg, 2005) is the default status quo. For the modern distance learner, such technological means would be workstation computers, laptops, mobile phones or tablet computers. Communication to and from the personal device – indeed the actual act of feedback and learning – would be

communication with a fixed server service, which would, in situations which require quizzing the pupil, compare the answers the pupil has submitted against its own pre-set correct answers. In situations where there is a need for essays on the part of the student, there would be a need for a predictive system which could understand and grade the essays for correctness and be sophisticated enough to be able to provide appropriate feedback.

When it comes to communication, there is a noticeable amount of services which provide no direct lines of communication with representatives of the organization providing the education. For non-subscribed members of sites such as *Codecademy* and *Udacity*, communication with human representatives of the sites in question are primarily in cases of tech issues, with a modicum of communication with other members of the community being in reasonably short supply. According to Holmberg (2005), the possibility for two-way communication should exist "so that the student may benefit from or even initiate dialogue (this distinguishes it from other uses of technology in education)". As such, so long as communication with an inanimate system is not considered direct, only users that upkeep a subscription to the varied sites providing e-learning services can be considered to be participating in distance education.

With always-available systems, in which the learning process can be initiated by the pupil at any time, Keegan's absence characteristic can be considered to be fulfilled easily by the modern systems that provide distance education. Holmberg, paraphrasing Keegan, claims that there is a "quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings for both didactic and socialization purposes".

As discussed above, Keegan's characteristics are relevant even in the contemporary setting, where automated systems have mostly marginalized human-to-human distance education and education related communication. Keegan's characteristics can also be found to apply even for the more modern methods and frameworks of distance education, which will be briefly discussed in the following chapters.

4. Common platforms and methods

Sarrab & Elgamel & Aldabbas (2012) claim, that modern students in their societies spend remarkably little time at desktop computers, instead opting for on-the-go alternatives while using personal handheld devices to send short e-mail messages and "view huge[sic] number of web pages each week, during the waiting time between classes" (Sarrab & Elgamel & Aldabbaas, 2012). They further posit, that at the time of writing, "the development of mobile application is not yet as matured as desktop or personal computer application development, which may take some time to establish and provide a well-accepted standards. Therefore, there is no standard developed for M-learning yet. But the existing E-learning standards and models can be used to develop M-learning applications."

The World Wide Web Consortium (W3C) has since released a HTML5 compliant version of their suggested standards for the development of web applications on mobile devices (W3C, August 2015). As in all cases regarding applications that use sensitive personal data, there has also got to be a particularly strong emphasis on information security.As such demands are considered, public and private organizations such as Future of Privacy Forum (FPF) and Center for Democracy and Technology (CDT) have also released their own guidelines in regards to the steps developers are to take when designing applications for mobile platforms (FPF & CDT, 2011).

In addition to issues surrounding privacy and accessability, there is also the need to consider content and content production. Fadde and Sullivan (2011) of Educause Review argue in their article on videos on the web that, when producing online instruction videos, the producing party must take the following two major concerns into account:

> "Producers of web-video instruction need to negotiate old and new rules of video grammar to remain credible (to the traditional video grammar) as they also strive to be cool (in the new video grammar).
>
> The goal is to avoid violating traditional video grammar while tapping into new video aesthetics to gain ethos with web-savvy audiences (like students)." (Fadde & Sullivan, 2011)

While the instructions themselves contained within the article are of a more technical nature, the two highlights make an excellent point in themselves: when the viewer, or listener, has the power to suspend, close, or dismiss the video being played, there is an absolute necessity of keeping the viewer-listener entertained and attentive through simply being interesting, as the degree of ease of shutting down a video is far lower than that of walking out of a brick and mortar classroom.

As a subsection of video lectures, there is also the participatory streamed lecture model. One of the more commonly known technologies for this is the Adobe ConnectPro, which delivers a customizable view to the learner on which can be projected both an image of the goings-on on the screen – for the lecture slides, most commonly - a streamed video image of the lecturer, and a chatspace for students and teaching staff to converse. Chatspaces are also commonly used to present questions for the teaching

staff, and there is a separate “Raise Hand” -button found on the system which is to call for attention from the lecturer. Pearse (2011) of the University of Maine discusses the version of ConnectPro available at the time comparing it to Cisco’s similar Webex system available at the time, concluding that

> Student learning and understanding of course material was facilitated and often enhanced by using this technology; both Webex and ConnectPro were extremely easy to use, and required virtually no additional preparation time; and the technology, once initial challenges were overcome, proved to be quite reliable and convenient. Although this instructor still prefers the traditional classroom experience, enhancing that experience with “living” powerpoint slides, session recording, and the ability to communicate face-to-face at odd hours and under unusual circumstances is most assuredly a good practice. (Pearse, 2011)

As such, using these distance education technologies was found to facilitate learning and did not come as an added burden. Additionally, adding additional incentives through gamification can yield further favourable results.

Michael Lee of the University of Washington, in his dissertation, conducted a study on how students learned the concepts of introductory programming concepts using a game called “Gidget” in 2015. Lee compared the results of the study and found that “the learners who took a *Codecademy* course and the learners who played through the *Gidget* game showed considerable improvement in their test scores. Though this was true of both cases, learners who played the *Gidget* game were able to match the post-test performance of learners who completed the *Codecademy* tutorial, in approximately half the time.” (Lee, 2015). As such, one can say that providing a gamification model for the study of programming improves learning results. *Codecademy*, in itself is “a popular online interactive tutorial website that offers free courses in multiple programming languages”, having “over 2.5 million users […] enrolled in the [Python Language Skills] course designed for beginners” (Lee, 2015).

5. The modern xAPI model

This chapter will be discussing briefly on a higher level some of the matters relating to the frameworks and working models within the field of distance education. This chapter will deal with the modern xAPI model that is the working horse behind many of the industry vendors dealing with learning environments.

Beginning formally with the Advanced Distributed Learning (ADL) Initiative in 1997, the modern xAPI model has been at the forefront for a model of a distributed, electronic learning environment. It could be argued, that the ADL Initiative began with the *Report of the Quadrennial Defense Review* (Cohen, 1996) where Cohen argued that the United States' "[…] fighting force of the next century must be an educated, dedicated, motivated force, and programs that keep it that way are an integral part of our force management policy […]" (p. 68). These initiatives seem to have led to the creation of the US Presidential Executive Order 13111 and the model known as Sharable Content Object Reference Model (SCORM).

SCORM is a system developed as a direct response to the Executive Order number 13111 laid down by United States of America president Bill Clinton on January 12, 1999. The particularly definite piece of the Executive Order that is interesting regarding SCORM is section 2, subsection (a), point 4, stating that "the Task Force shall […] recommend standards for training software and associated services" and that "These standards should be consistent with voluntary industry consensus-based commercial standards." (Executive Order 13111, 1999). The SCORM standard was further developed into a form which was adopted by the ISO (Internation Organization for Standardization) subcommittee ISO/IEC (International Electrotechnical Commision) JTC1/SC36 (Joint Technical Committee, Subcommittee for Information Technology for Learning, Education and Training) as ISO/IEC TR 29163 in 2009. Following this the ADL commenced the creation of Project Tin Can, which would later be renamed as xAPI.

xAPI, also known as Tin Can API or experienceAPI is on the other hand a system developed from the SCORM framework to essentially grow upon the latter, stating on their GitHub project manifest, that:

> "The goals of the xAPI are:
>
> - To make it easier to understand and compare learning experiences and their outcomes recorded across a wide variety of contexts, platforms and technologies.
> - To maximize interoperability of services which create, gather, store and process information about learning experiences.
> - To provide a guide to those who want to build applications that conform to and implement this specification.
> - To provide criteria against which conformance to this specification can be tested." (ADL Initiative & US DoD, xAPI-About.md)

Essentially, the xAPI is to act as a form of formatted datasources and interaction agents in conjunction with *Learning Record Stores* (LRSs). The LRS functions as a form of a

database for the learning experiences. In essence, the xAPI data flow is as follows: “The learner has a learning experience, which is tracked by a learning record provider, which creates and sends records to the learning record store, which stores these records about the learning, [which] a learning record consumer can access […] to acquire learning records” (figure 5.1).

Figure 5.1.: “Figure 1: Data Flow in xAPI”. Source: https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-About.md

As mentioned earlier, an LRS is a shorthand for a *Learning Record Store*, a system designed to receive, store, and provide access to incoming learner data from an activity stream and can further combine the given data into Person Objects (POs). These POs will also classify the added context for the learning event, be it in a work environment, out on the town with friends, or in the office lounge during a coffee break. Pictured below is how an LRS handles data from different sources and contexts and differentiates and categorizes them accordingly:

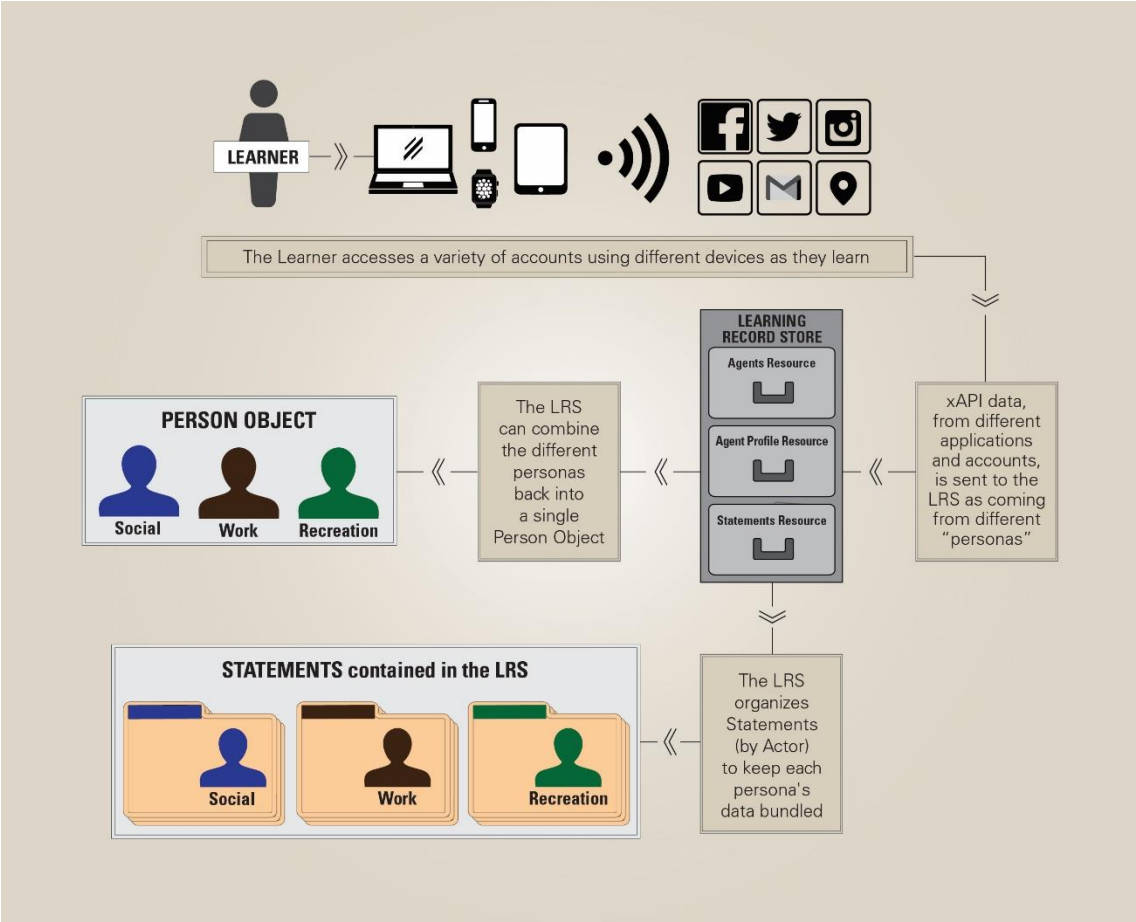

Figure 5.2.: “Figure 3: xAPI Agent and Persona Management” Source: https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-About.md

Activities in the within xAPI can be understood as components of an *activity stream*. The ADL Initiative themselves define activities as “A type of Object making up the "this" in "I did this"; it is something with which an Actor interacted. It can be a unit of instruction, experience, or performance that is to be tracked in meaningful combination with a Verb. Interpretation of Activity is broad, meaning that Activities can even be tangible objects[…]” (ADL Initiative & USDoD, xAPI-About.md). It can therefore be considered a very loose interpretation of the word, as just about any kind of metaphysical and personal experience or interpretation can be considered an Activity in the xAPI framework. Pictured below is the apparent relation between an actor, an Activity, and an LRS, which breaks down into different relations within the xAPI statement:

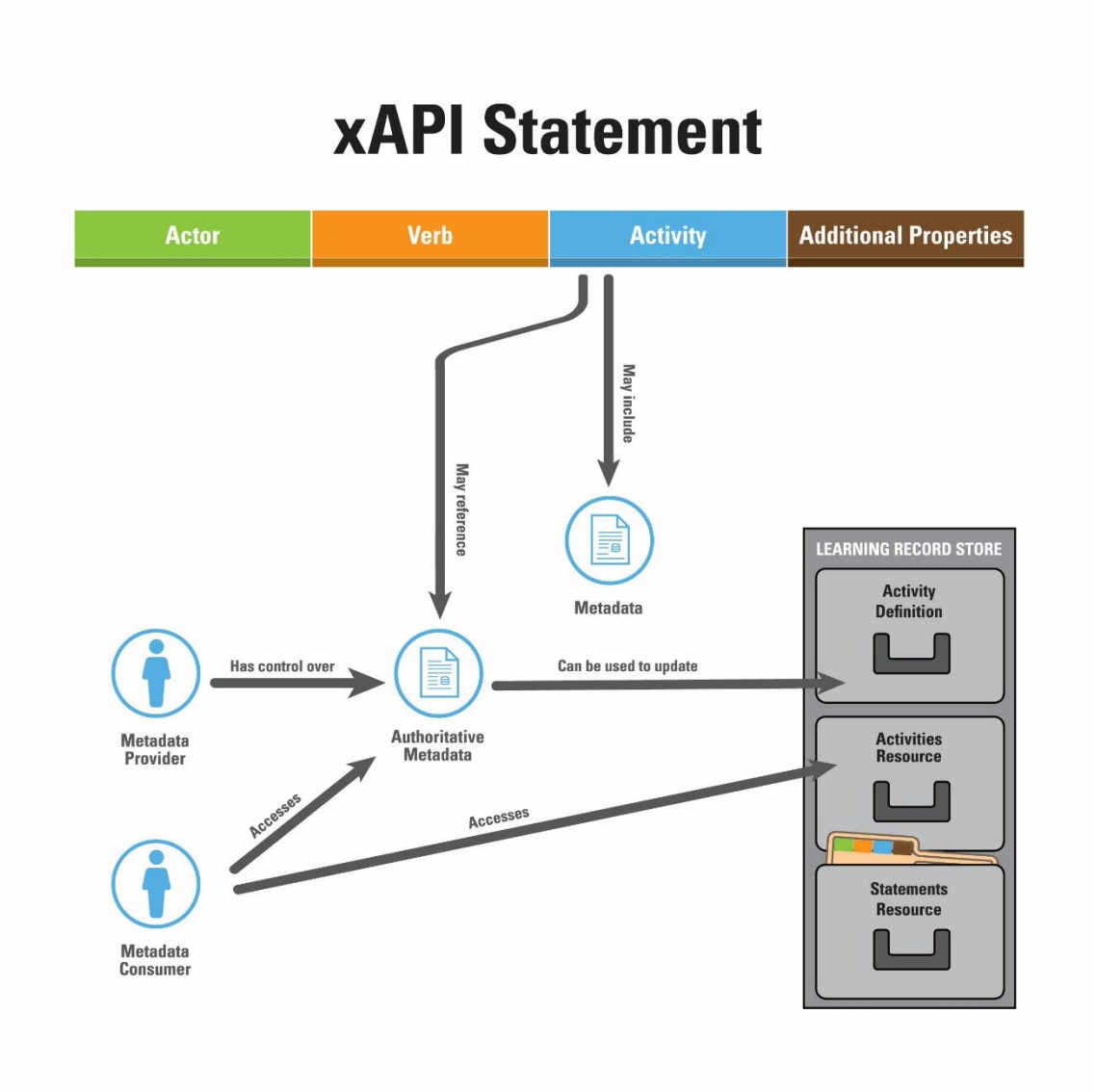

Figure 5.3.: “Figure 2: xAPI Activity Data and Metadata”. Source: https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-About.md

xAPI can be used to serve as a basis for LMSs, or *Learning Management Systems*, which are essentially and “typically a web-based system that allows learners to authenticate themselves, register for courses, complete courses and take assessments” (ADL Initiative & USDoD, xAPI-About.md), therefore also fitting a very broad template for systems and service providers, such as Udacity, Codecademy, Moodle, Optima, and others. The essential benefit being that xAPI considers both micro- (“I

need a solution to this problem") and macro-learning ("I need to learn a solution for these kinds of problems") activities and treats them as such. xAPI even considers social learning a part of the the activity stream.

6. Educational support programs

As education keeps being increasingly available through the internet, there are to be expected a large number of programs of varying degrees and difficulty levels. These programs may range from the 'educate the public' stand point to ultra-professional, exhaustive programs aimed at continuing education institutions.

As a rule of thumb, these programs are examples of either permanent or timed projects, where the education is organized either for a constant need or a quick shift in need for educated workforce. One such example is the University of Helsinki working together with Reaktor Oy, a multinational Finland-based ICT consulting company, on educating the public in basic concepts about artificial intelligence.

6.1 National programs

There are currently many other national actors in Finland in the education export stage as well, and many if not most of these also deal with e- and m-learning. One of these, Education Export Finland (EEF) is a fairly recent actor in the field, being founded in 2015, and aimed at "increasing Finnish education export in the international markets" (EEF, 2016).

Cai, Hölttä and Kivistö (2012) discuss the contemporary history of Finnish education export – particularly in the field of higher education.

> Given the recent government policy priorities and emphasis, higher education, although only to limited extent, is clearly one of these sectors. Second, it seems that there is an ever-growing demand for good quality higher education around the world, and this situation is likely to continue in the future. This shows a favour towards models used in the UK or Australia, where higher education has become a major export service. However, the unique advantages of these countries, such as the availability of diversified courses delivered in English and the environment that provides for improving English language skills are not available for Finland. Also given the facts that Finland is geographically isolated from important economic and industrial centres, has rather high living expenses, a climate which may deter international students or immigrants, and a difficult language, Finnish HEIs may encounter additional challenges when promoting their fee-based education (Cai & Hölttä & Kivistö, 2012, p. 216).

In this regard, Finland might be seen to gain from education export, particularly if executed well and properly by higher education institutes (HEI). Cai et al. (2012) go on to discuss the readiness level of Finnish HEIs to undertake such a task. Cai et al. (2012), citing Healey (2008), argue that "as the higher education sectors in developing countries scale up and consumers become more sophisticated, it is likely that demand to study abroad, particularly at the lower status universities now so dependent on international students, will decline rather than continue to grow at recent rates", to support their concern that "when charging fees from domestic students is allowed, many universities may "begin to retreat from internationalization and return to their 'core activities' of

research and teaching domestic students" (Healey 2008)" (Cai & Hölttä & Kivistö, 2012). Therefore, it could be argued that individual HEIs should not proceed with their own programs for m-learning environments, but to combine production and marketing resources with each other and other educational institutions.

6.2 International programs

One of the more recent MOOC programs, organized by the United Nations Environment Programme (UNEP) branch, the United Nations Industrial Development Organization (UNIDO), International Labour Organization (ILO), the United Nations Development Programme (UNDP), and the United Nations Institute for Training and Research (UNITAR), spearheaded by the Partnership for Action on Green Economy (PAGE), is named "Introduction to Green Economy: Concepts and Applications". This is a joint venture between these five aforementioned agencies, and a "state-of the art virtual learning course, which introduces participants to different concepts and facets of the green economy, as well as the global, national and sector-specific challenges and opportunities associated with the green transition." (PAGE, 2015). Courses such as this one, ones aimed at both individuals unable to, for financial or geographic reasons, participate in physical courses, or individuals willing to learn of subjects on their own accord, can be expected to become more and more available.

In addition to joint international programs, there are also several institutions which offer their national level courses internationally. The University of Athens e-learning program has a strong focus on classical Greek history and philosophy (NaKUoA elearning, 2016). While the program can be seen as commercial, with a price of 200-300 euros per course, it can also been seen as a method of continuing ones education on an individual level.

The European Union has also released a web site highlighting some of the programs currently under the umbrella of the EU Open Education Europa program, in cooperation with the Erasmus+ program. This includes programs such as "Cultural Translation in Massive Open Online Courses", Understanding the MOOC Scoreboard: Methodology and Misconceptions" and "MOOC Design Principles. A Pedagogical Approach from the Learner's Perspective" (OEE, 2016).

Programs like these are aimed at the international community, and mainly use English. As such, they may not be available for non-English speaking audiences, and would require a national variant as well, if accurate translations are not provided in tandem with the releases provided by the producers.

7. Possible future developments

What the future will bring for the field of distance education is fairly unknown. While it is true that the world is growing more and more interconnected, there are murmurs of those in need of education for the betterment of their lives being unable to engage in education due to the demands of what keeps them alive. It is a commonly referred to theory that learning is a very subjective experience, and one cannot be expected to be able to truly learn – not just memorize – something when they simply do not have the time or the energy for experimentation and self-education.

There are many ways to imagine the classroom of the future. There aren't necessarily walls, nor will there necessarily be teachers. There might be an instance of an artificial intelligence (AI) that can pick up on nuances and artistry in essays about poetry. All knowledge might be mathematically absolute, yet there might still be room for inspiration and creation. What needs to be interpreted is whether this future is utopian or dystopian. Perhaps humans will instead be detached from the need for information and be able to consume any and all information they wish at any given moment in a truly mobile fashion. Authors in the field of science fiction have often wondered on these kinds of issues and whether absolute information available absolutely anywhere and at any absolute time is a positive or a negative future.

The future might seem like a faraway thing, but we need not look that far for global developments. Just recently a Boston based company, Ambi, released a press report on how "Ambi is changing how the world learns by engaging today's learners, together. Ambi is a Learner Engagement Platform matching how today's learners communicate and interact on social media, which gives everyone a more engaged, involved, and immersive learning experience." (ambi, Business Wire, 2019). Ambi would seemingly seek to achieve a global learning space through the lessons learned from the currently leading social media giants, with their own LMS and through their own LRS that would mimic a social learning experience. These kinds of environments might be stepping stones to tying skills and education further into our online personae – such as a professional profile listed on *LinkedIn*.

On the other hand, universities that were once considered to be prestigious gatekeepers of knowledge that only the select few were allowed entry are now offering some of their curricula online for free, with Harvard and MIT and many more offering their content available to the public. These globally top-ranked universities even offer verified certificates of completion for a fraction of the price students in their brick and mortar institutions pay.

As the future of education moves to be further online, there is an opportunity to make learning a ubiquitous and ever-present experience.

8. Conclusions

This thesis examined the history of distance education, e-learning, and m-learning. The findings have been that there is a constant development in terms of technology and methods used in these fields. MOOCs can indeed be seen as a viable alternative or supplemented resource to brick and mortar institutions, using contemporary methods, and will likely be used increasingly so without, however, surpassing or dethroning HEIs as the 'gatekeepers' of higher education.

Furthermore, particular attention has been given to the xAPI framework, developed by the Advanced Distributed Learning (ADL) Initiative and the United States Department of Defense as a framework for assessing and advancing individuals' skills within and without the armed services.

There is an additional need for research, particularly in how and to what degree commercial MOOC programs are able to retain their learner-customer base and whether these same results apply to publicly funded programs – in other words whether invested money is an incentive to follow through on one's education.

References

Advanced Distributed Learning Initiative & U.S. Department of Defense. *Experience API – Advanced Distributed Learning (ADL) Co-Laboratories.* Retrieved on 16.4.2019 https://github.com/adlnet/xAPI-Spec/blob/master/xAPI-About.md

Berge, Z.L. & Muilenburg, L.Y. (eds) (2013). *Handbook of Mobile Learning.* New York: Routledge; 2013

Cai, Y. & Hölttä, S. & Kivistö J. (2012). *Finnish higher education institutions as exporters of education – Are they ready? Higher education research in Finland Emerging Structures and Contemporary Issues* (Ahola & Hoffman ed.). University of Jyväskylä, Jyväskylä, Finland.

Cohen, William S (May 1996). *Report of the Quadrennial Defense Review. Washington, DC: Secretary of Defense.* Retrieved on 15.4.2019 http://www.bits.de/NRANEU/others/strategy/qdr97.pdf

Education Export Finland (2016) Retrieved on 5.12.2016 from http://www.exportfinland.fi/ohjelmat/future-learning-finland

El-Hussein, M.O.M., & Cronje, J.C. (2010). *Defining Mobile Learning in the Higher Education Landscape.* Educational Technology & Society, 13 (3), 12-21

elearningeuropa.info (2016) *Open Education Europa Beta, Europe's community for innovative education.* Retrieved on 5.12.2016 from https://www.elearningeuropa.info/

Enklenberg, J.; Kentz, M-B.; Hatakka, O. (eds); *Emerging Practices in Educational Technology;* University of Joensuu, Savonlinna Department of Teacher Education; 2006; Joensuun yliopistopaino, Joensuu

Exec. Order No. 13111, USING TECHNOLOGY TO IMPROVE TRAINING OPPORTUNITIES FOR FEDERAL GOVERNMENT EMPLOYEES, Retrieved on 1.4.2019 https://archive.opm.gov/pressrel/1999/eo.htm

Fadde, P. & Sullivan, P. (15.12.2011). *Cool and Credible Web Video: Old Rules, No Rules, or New Rules?* Educause Review. Retrieved on 5.12.2016 from http://er.educause.edu/articles/2011/12/cool-and-credible-web-video-old-rules-no-rules-or-new-rules

Future of Privacy Forum & Center for Democracy & Technology (year unknown). *Best Practices for Mobile Application Developers.* Retrieved on 5.12.2016 from https://fpf.org/wp-content/uploads/Best-Practices-for-Mobile-App-Developers_Final.pdf

Google Trends. *Comparison of "e-learning", "m-learning", "online learning", "net learning", and "web learning".* Retrieved on 15.9.2019.

https://trends.google.com/trends/explore?date=all_2008&gprop=news&q=e-learning,m-learning,online%20learning,net%20learning,web%20learning

Hafenbredl, Saul (Business Wire). *Ambi Advances Mission to Transform Learning Worldwide With Announcement of First-ever 'Learner Social Network'*. AP NEWS. Retrieved on 16.4.2019 https://www.apnews.com/Business%20Wire/b52af86a94c44266bf1b6dfaa1c3abbc

Hardesty, L. (2012, July 16*). Lessons learned from MITs's prototype course*. MIT News. Retrieved on 5.12.2016 from http://web.mit.edu/newsoffice/2012/mitx-edx-first-course-recap-0716.html

Holmberg, B. (2005). *The Evolution, Principles and Practices of Distance Education*. BIS-Verlag der Carl von Ossietzky Universität Oldenburg; 2008

International Telecommunication Union. *ICT Facts and Figures 2017*. 31.7.2017. Retrieved on 14.9.2019. https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

Keegan, D. (1990). *Foundations of distance education*. London and New York: Routledge; 2005

Lee, M.J. (2015). *Teaching and Engaging with Debugging Puzzles*. University of Washington. 2015

Lueth, Knud Lasse. *State of the IoT 2018*: *Number of IoT devices now at 7B – Market accelerating*. Retrieved on 12.10.2019. https://iot-analytics.com/state-of-the-iot-update-q1-q2-2018-number-of-iot-devices-now-7b/

Millard, Andre. *"Cassette Tape"*. St. James Encyclopedia of Popular Culture, 2.1 edition. St. James Press.

Moore, Michael G. & Kearsley, Greg. *Distance Education: A Systems View*. Wadsworth Publishing Company. 1996.

Moore, Michael G. & Kearsley, Greg. *Distance Education – A Systems View of Online Learning. 3rd Edition*. Wadsworth, Cengage Learning. 2012.

National and Kapodistrian University of Athens elearning (2016). Retrieved on 5.12.2016 from http://elearninguoa.org/

Nevgi, Anne; Löfström, Erika; Evälä, Annika (eds.). *Laadukkaasti verkossa, Yliopistollisen verkko-opetuksen ulottuvuudet.* Educational Sciences, Institute of Behavioural Sciences, University of Helsinki. 2005. Yliopistopaino

Ossiannilsson, E. (2012). *Benchmarking E-learning in Higher Education – Lessons Learned from International Projects*. University of Oulu. Juvenes Print, Tampere; 2012

Ota, M.A. & de Araujo C.F. Jr (2016). *M-Learning Challenges in Teaching Crosscutting Themes in the Education of Young People and Adults*. 12th International Conference Mobile Learning 2016

Pankkonen Kari, edit. (2005), *Onnistunut pilotti alueelliseen maisterikoulutukseen: Oulun yliopiston Tietojenkäsittelytieteiden laitoksen totettama Digitaalisen median*

ma9isteriohjelma vuosina 2001-2004. University of Oulu. Oulun Yliopistopaino, Oulu; 2005.

Partnership for Action on Green Economy (2015). *Introduction to Green Economy: Concepts and Applications.* Retrieved on 5.12.2016 from http://www.un-page.org/knowledge-resources/e-learning-courses

Pearse, J.R. (2011). *Challenges and Opportunities of Distance Learning Using Adobe ConnectPro and Webex.* American Society for Engineering Education. Pp.22.1511.1-22.1511.11

Peters, M.A. & Britez, R.G. (2008). *Open education and education for openness*. Sense Publishers, Rotterdam.

Peters, M.A. (2008). *The History and Emergent Paradigm of Open Education*. Sense Publishers, Rotterdam.

Picciano, Anthony G. *Bleding with purpose: the multimodal model*. Journal of Asynchronous Learning Networks, Volume 13: Issue 1, pp. 7-18. 2009.

Rosen, Adam (22.11.2011). *Those Were the Days: Multimedia Computers from HP, Packard Bell and Apple in 1996.* Cult of Mac. Retrieved on 16.8.2018. https://www.cultofmac.com/115216/those-were-the-days-multimedia-computers-from-hp-packard-bell-and-apple-in-1996/

Rustiadi, Sonny. *Creating Better Education System, Building Stronger Human Capital: A Creative Industries Perspective*. The 6th Indonesia International Conference on Innovation, Entrepreneurship and Small Business, 12 – 14 August 2014. Procedia – Social and Behavioral Sciences 169 (2015) pp. 378-386.

Saba, Farhard, Ph.D.. *Introduction to Distance Education*. Distance-Educator.com 16.11.2013. Retrieved on 1.5.2019 http://distance-educator.com/introduction-to-distance-education-educational-radio/

Saba, Farhard. *Introduction to Distance Education: Educational Radio.* Distance-Educator.com 16.11.2013. Retrieved on 14.9.2019. http://distance-educator.com/introduction-to-distance-education-educational-radio/

Sarrab, M. & Elgamel, L. & Aldabbas, H. (2012). *Mobile Learning (M-Learning) and Educational Environments*. International Journal of Distributed and Parallel Systems (IJDPS) Vol.3, No.4, July 2012

U.S. 62. Congress. *An Act To regulate radio communication*. Sixty-second Congress, Session II, Chapter 287. 1912.

Udemy Support. *Instructor Revenue Share*. Retrieved on 16.8.2018 from https://support.udemy.com/hc/en-us/articles/229605008-Instructor-Revenue-Share

Uhlig, Robert. *DVD kills the video show as digital age takes over*. The Telegraph. 22.11.2004. Retrieved on 12.5.2019. https://www.telegraph.co.uk/technology/3335984/DVD-kills-the-video-show-as-digital-age-takes-over.html

Young, Jeffrey R.. *'Bandwidth Divide' Could Bar Some People From Online Learning.* The Chronicle of Higher Education. 4.3.2013. Retrieved on 12.5.2019 https://www.chronicle.com/article/The-Bandwidth-Divide/137633